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### TITLE: A REVIEW ON CROP PROTECTION SYSTEM

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#### Abstract

India having the largest agriculture area in the world mostly depends on rainy season for water. The vegetables, fruits, and other crop are damaging due to heavy wind, heavy rains and hail storm and farmers faces huge financial loss. In India huge population getting employment from agriculture and heavy loss of crop lower down the income of farmers also it afflicts the GDP of the nation. A Shade house can solution over the problem of heavy rain and hail storm but the rigidity and fix structure unable to offer direct sunlight to the crop hence there are few crops n flowers can only be cultivated inside the shade house. We proposed a workable and economical shade house structure which can affordable to small farmers and can used to take various crops inside the shade house which protect crops from heavy wind, heavy rain and hail storm and can removed within one click using mechanical arrangement.

**Index Terms:** Protectingshade, Crop, Hailstorm, Rainfall, Agriculture etc.

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#### 1. INTRODUCTION

Growing plants is both an art and a science. About 95% of plants, either food crops or cash crops are grown in open area before, but in recent time due to uneven climatic changes huge loss of crops and plants take place that reduce the production of crops [4]. Protected cultivation means have some level of protection over plant by weather changes. This can achieve by crop protecting system. In crop protecting system quantity of crop produced is better, higher input use efficiencies are achieved.

Crop protecting shade has been suggested for the cultivation of different crops in open filed. Production of crops involves firstly protection of production stage of crops mainly from adverse environment conditions such as temperature rise, hail storm, scorching, sun radiation, heavy rains, snow and frost. The crop protecting shade covered with shade material can be used according the requirement and condition. It should be transparent and have strength to with stand in adverse condition too. This protects crops from environment changing condition and provides favorable condition. The cost of basic structure for housing rigid or flexible covering material

depending upon the structure materials selected such as G.I. pipe, M.S. angles, fiber glass reinforced polyester, glass, acrylic etc. Besides this the total cost of crop protecting shade also depends on the covering materials used. Such as crop protection shade made of costly materials as mentioned above are however expensive and for the average Indian farmer to overcome these problems and to suit to farmer's economy in construction of these crop protecting system in their field, a low cost wooden structure may be used as a second cheap option.

These structures are suitable for any covering materials like film plastic sheets, shaded nets, UV stabilized LDPE film sheets [6]. The results may obtained from the plant grown under these crop protecting system suggest that this might be a feasible technology for small and marginal farmers too as it result in a much higher production and enables growing off-season crops too.

#### 2. LITERATURE REVIEW

**Pratap S. Birthal<sup>1</sup>, Md. Tajuddin Khan, Digvijay S. Negi and Shaily Agarwal, (2014)**[1] analysed changes in climate

variables, viz. temperature and rainfall during the period 1969-2005 and has calculated their impact on yields of important crops. A significant fall was observed in mean monthly temperature, but more so during the post-rainy season. The uneven changes in rainfall were not as significant. While rise in maximum temperature was found to have an adverse effect leads to global climate changes and their resulting extreme climatic changes. In future agriculture is experiencing an increasing need to protect the crops from their variable environment. The production of pulses will be affected more by the climate change than of any other crop. If the climate does not change significantly, yield losses will be much decrease.

**Ruchita S\* and Rohit S (2017)[7]** discussed increasing global temperature is not only causing climate change but also caused to the irregular rainfall patterns. Uneven rainfall patterns, increased temperature, rise CO<sub>2</sub> content in the atmosphere are important climatic contents which affects the crop production. Research studies indicate that this weathering parameters influence about 67% compared to other factors like soil and nutrient management their proportion of affect was 33% during the cropping season. The Intergovernmental Panel on Climate Change (IPCC) calculated that the global mean surface temperature will likely rise and may result into uneven climatic changes. This rising temperature may be reason for loss in crop yield at large scale. It has been reported in 20th century that rising temperature is major parameter and main reason for global warming as compared to precipitation. Researchers have calculated that crop yield falls by 3% to 5% for each 1°F increase in the temperature.

**Josef Tanny(2013)[3]** review that screen houses for crops having relatively light shading screens reduce the absolute velocity of the approaching external wind but change the wind direction, and the turbulence properties of the boundary layer. Pitched roofs houses have the potential of increasing the ventilation rate as compared to flat-roof houses. These points also considered by screen house designers as ventilation are necessary for adequate crop growth and production. The practice of porous screens to cover agricultural crops is constantly increasing in recent time. Screens are likely used to reduce high radiation sun rays and wind speed also to protect the crop from hail storms and rainfall. Shaded house is a framed structure mostly made of materials such as GI pipes, angle iron, wood or bamboo. It is covered with plastics net (Nets are made of 100% Polyethylene heard with specialised UV treatment) having different shade percentages. It provides under controlled atmosphere and environment by reducing light intensity and effective heat during day time to crops. Hence, round the year seasonal and off-season production is possible. **Henningson et al (1999) [9]** studied plant protection device in the form of a weather protection extensible over the crop production. The crop protection system including a

framework consisting of longitudinal and traverse support elements within which at least one waterproof foldable plant protection shade is extensible from a folded up position and vice versa. **Dan Drostand Tiffany Maughan(2018)[4]**. Therefore, we are using shades to protect crops from undesired effects of hazardous climatic and environmental factors. Recently there is not much work available on shade net cultivation of crops. There is an urgent need to assess the cultivation and need of different vegetables under shade net house to meet the rising demand of the crops. Thus, the investigation was aimed to determine the efficiency of shade net cultivation compared to open field on rise yield of tomato during summer and winter season. Protected agriculture has increasing now days to help improve agricultural productivity.

### 3. CURRENT STRUCTURES AND SCREENS USED

#### 3.1 Types of structure:

The type of construction for crop protection is influenced by structural material, though the covering material also influences in same amount. Higher the life span, stronger should be the material and more structural members are added to make crop protection system. For smaller structure simple designs like hoops can be followed. So based on construction it can be classified as:

- Wooden framed structure.
- Pipe framed structure.
- Truss framed structure.

#### 3.2 Type based on covering material:

Covering shade materials are the important component of the crop protection structure. They have direct influence on crops, The types of structure and method of fixing also varies with covering material. Hence, based on the type of covering material they may be classified as follows:

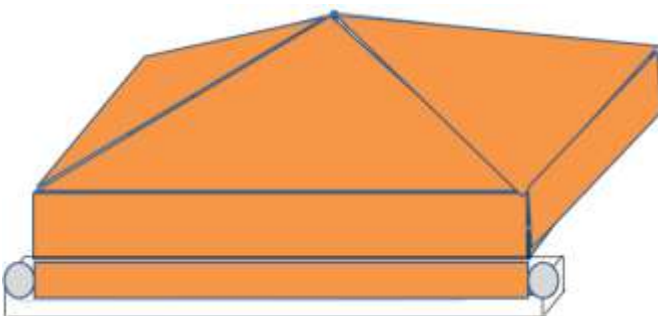
- Glass glazing.
- Fiber glass reinforced plastic (FRP) glazing
  1. Plain sheet
  2. Corrugated sheet.
- Plastic film
  1. UV stabilized LDPE film.
  2. Silpaulin type sheet.
  3. Net house.

## 2. PROPOSED CROP PROTECTION SYSTEM

Proposed structures consist of different diameter made of GI pipe. A large diameter GI pipe is used to support the whole structure to make base part strength of material and diameter depends upon the complete parameter of local condition and area of structure. Upper part of the shade is made of small diameter pipes that used to support the shade frame and they form the conical parts at the top having several benefits it can withstand the heavy rain and hailstorm due to its conical area water will not collect at the top it flows down and small strips used to support the shade screen material depend upon the type of crop we have to grow roller mechanism is used to open and closed the screen. Manual roller is situated at the edges of the top structure complete structure is attached by bolts and can be assembled and disassembles according to need and base is fixed. Material use in crop protection shade is according to requirement. it can used to protect the plants from the adverse climatic conditions such as wind, cold, precipitation, excessive radiation, extreme temperature the height of the structure depends on the crop grow and it increase the production reducing the losses cause by the climatic issue.



**Fig-2: Proposed Crop Protection System**



**Fig-3 Design for crop protection system**

### 3. MATERIAL AND METHODS

The market abounds with different types of screens from many manufacturers around the world. Manufacturers usually provide only partial information on screen properties e.g.

colour, shading percentage or number of mesh, which Makes comparison between experiments and reproduction of certain experimental conditions hardly possible [2]. Noted this issue and suggested that for wovenscreens, with simple rectangular holes and round mono filament threads, mean and standard deviations of thread diameter and distance between threads in the wrap and weft directions should be documented. However, as [2] mentioned, for screens of complex weave (e.g. knitted) or with non-round threads, there is still no reliable method for documentation, and appropriate innovations are needed [5]. Shade nets are available in various shade percentages or shade factor i.e. 15%, 35%, 40%, 75% and 90% (such as 35% shade factor means thenet will stop 35% of light intensity and would allow only 65% of light intensity to pass through the net). Crop protecting shade is preferably made from cheap and easily available materials. Wood, bamboo and steel are usually suitable for the construction of shade. The frame of glass and rigid plastic greenhouses is usually made aluminium or steel or G.I iron. Foundations are usually constructed of concrete. All these materials have advantages and disadvantages. For example, wood can swell and shrink due to humidity. Encouraged by humidity, fungi and insects can infest the wood, causing rotting and decay. Therefore, wood has to be protected for longer usage. In addition, it has to be protected from termites. The selection of the construction material depends on the local prices for timber and steel. For the time being, wood construction is cheaper in many countries. Wood used in greenhouse frames is (or should be) protected by impregnation with protective substances, namely synthetic.

### 4. CONCLUSION

The severe reason for the crop destruction in recent time is wind, cold, precipitation, excessive radiation; extreme temperature and it will increase in upcoming time. In order to save crops from this condition crop protection system may play an important role and easily solve the problem also give a favourable condition for sessional plants and increase production rapidly. Crop protecting system design and material completely depend on the local climatic condition.

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